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## PROJECTION OBJECTIVE

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CENTRAL FAX CENTER

FEB 19 2009

## BACKGROUND OF THE INVENTION

[001] 1. Field of the invention

The invention relates to a projection objective for short wavelengths, in particular for wavelengths  $\lambda < 157$  nm, having a number of mirrors that are arranged positioned precisely in relation to an optical axis, and wherein the mirrors have multilayer coatings. The invention also relates to a projection exposure apparatus for EUV lithography as well as an X-ray optical subsystem for X-rays of wavelength  $\lambda_x$ .

[002] 2. Description of the Related Art

Projection objectives that are used in the extreme ultraviolet region are transradiated with soft X-radiation. Here, the wavelength region is at 10 to 30 nm. The materials previously capable of use for the optics are opaque to the extreme UV light used in the case, the imaging beams no longer being guided through lenses by refraction, but it being possible only to make use of mirrors. The mirrors used should have as high a reflectivity as possible in the EUV region. Such mirrors comprise a substrate that is provided with a multilayer system, also termed multilayer. This permits the implementation of mirrors of high reflectivity in the X-ray region when the incidence is not grazing, that is to say the implementation of normal incidence mirrors. Layer systems, for example with Mo/Si (molybdenum/silicon), Mo/Be (molybdenum/beryllium), MoRu/Be layer stacks with 40 to 100 layer pairs can be used for such multilayer systems, it being possible thereby to achieve peak reflectivities of 70 to 80% in the EUV region with  $\lambda = 10$  to 20 nm. Different layer